standard space network protocol format. The Space Network Protocol format of the present invention is shown diagrammatically in FIG. 4.

In the preferred embodiment, the spaced-based server implements a modified form of Space Communications Protocol Standards-Transport Protocol (SCPS-TP) as an extension of the well established Transmission Control Protocol/Internet Protocol (TCP/IP) internetworking protocol to handle specific congestion related problems unique to space transmission applications of the TCP/IP. These can include propagation delay time, bandwidth limitation/allocation by law, asymmetric link capabilities, and intermittent connectivity, all of which contribute to degradation of space-to-ground communications performance.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that these are capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

What is claimed is:

1. A space-based server network architecture which permits on demand transfer of data between a client satellite in an orbit about earth and an earth station irrespective of the location of the client satellite relative to the earth station, the space-based server architecture comprising:

a) a plurality of client satellites located in one or more earth orbits;

b) a plurality of server satellites located spaced apart in at least one earth orbit and being sufficient in number to provide substantially total world-wide communications coverage to and connectivity with designated and authorized earth stations and said plurality of client satellites, said at least one earth orbit of said server satellites being higher than said one or more earth orbits of said client satellites, each of said server satellites including:

i) communications downlink means for providing intercommunication with designated and authorized earth stations within its field of view;

ii) communications crosslink means for providing intercommunications with other server satellites within its field of view;

iii) communications link means for providing intercommunication with a client satellite within its field of view; and

c) whereby control data for a particular client satellite originating from an earth station is passed directly to an accessible server satellite within its terrestrial communications link field of view and said accessible server satellite, in turn, passes said control data either directly to said particular client satellite over said communications link means if within its communications field of view, or transmits said control data over said communications crosslink means to a server satellite having direct communications access to said particular client satellite; and

d) whereby each client satellite can at any time transmit its mission data to a designated earth station, irrespective of its location on earth, by transmitting said mission data over said communications link means to a server satellite within its communication field of view which, in turn, passes said mission data either directly to the designated earth station over said communications downlink means if within its communications field of view, or transmits said mission data over said communications crosslink means to a server satellite having communications downlink access to the designated earth station.

2. A space-based server network architecture as in claim 1, wherein said communications downlink means comprise a high frequency band spot bean antenna sufficient to provide jam-resistant communications.

3. A space-based server network architecture as in claim 1, wherein said communications crosslink means comprises a wide-band optical laser communications link.

4. A space-based server network architecture as in claim 1, wherein said communications crosslink means comprises a radio frequency communications link.

5. A space-based server network architecture as in claim 1, wherein said communications link means comprises a W-band communications link.

6. A space-based server network architecture as in claim 5, wherein said communications link means further includes an omni RF communications link to ensure tracking capability and connectivity between a server satellite and a client satellite during initial launch and orbit insertion of said client satellite and in the event of tumbling or partial loss of attitude stabilization of said client satellite.

7. A space-based server network architecture as in claim 1, wherein each of said server satellites includes high capacity onboard memory sufficient for cache storage or longer term storage of earth station generated communications data.

8. A space-based server network architecture as in claim 1, wherein said server satellites include communications links oriented pointed upwards towards said server satellites.

9. A space-based server network architecture as in claim 1, wherein:

a) said server satellites are placed in geosynchronous orbit; and

b) said client satellites are placed in either one of a low or medium earth orbit.

10. A space-based server network architecture which permits on demand transfer of data between a client satellite in an orbit about earth and an earth station irrespective of the location of the client satellite relative to the earth station, the space-based server architecture comprising:

a) at least one earth station;

b) a plurality of client satellites located in one or more earth orbits;

c) a plurality of server satellites located spaced apart in at least one earth orbit and being sufficient in number to provide substantially total world-wide communications coverage to and connectivity with designated and authorized earth stations and said plurality of client satellites, said at least one earth orbit of said server satellites being higher than said one or more earth orbits of said client satellites, each of said server satellites including:

i) communications downlink means for providing intercommunication with said at least one earth station;

ii) communications crosslink means for providing intercommunications with other server satellites within its field of view;

iii) communications link means for providing intercommunication with a client satellite within its field of view; and

d) whereby control data for a particular client satellite originating from said at least one earth station is passed directly over to an accessible server satellite within its terrestrial communications link field of view and said accessible server satellite, in turn, passes said control

data either directly to said particular client satellite over said communications link means if within its communications field of view, or transmits said control data over said communications crosslink means to a server satellite having direct communications access to said particular client satellite; and

e) whereby each client satellite can at any time transmit its mission data to said at least one earth station, irrespective of its location on earth, by transmitting said mission data over said communications link means to a server satellite within its communication field of view which, in turn, passes said mission data either directly to said at least one earth station over said communications downlink means if within its communications field of view, or transmits said mission data over said communications crosslink means to a server satellite having communications downlink access to the designated earth station.

11. A space-based server network architecture as in claim **10**, wherein said communications downlink means comprise a high frequency band spot bean antenna sufficient to provide jam-resistant communications.

12. A space-based server network architecture as in claim **10**, wherein said communications crosslink means comprises a wide-band optical laser communications link.

13. A space-based server network architecture as in claim **10**, wherein said communications crosslink means comprises a radio frequency communications link.

14. A space-based server network architecture as in claim **10**, wherein said communications link means comprises a W-band communications link.

15. A space-based server network architecture as in claim **14**, wherein said communications link means further includes an omni RF communications link to ensure tracking capability and connectivity between a server satellite and a client satellite during initial launch and orbit insertion of said client satellite and in the event of tumbling or partial loss of attitude stabilization of said client satellite.

16. A space-based server network architecture as in claim **10**, wherein said server satellites include communications links oriented pointed upwards towards said server satellites.

17. A space-based server network architecture as in claim **10**, wherein:

a) said server satellites are placed in geosynchronous orbit; and

b) said client satellites are placed in either one of a low or medium earth orbit.

18. A space-based server network architecture as in claim **10**, wherein said at least one earth station comprises land-based, sea-based and airborne platforms.

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